

At a Glance

What it is

■ The Electromagnetic Railgun is a long-range, high-energy gun launch system. It uses electricity rather than gun powder or rocket motors to launch projectiles. Its projectiles strike at more than 200 nautical miles in approximately six minutes.

How it works

■ Electricity generated by the ship is stored over several seconds in the pulsed power system. Next, an electric pulse is sent to the railgun, creating an electromagnetic force accelerating the projectile to Mach 7.5. The kinetic energy warhead eliminates the hazards of high explosives in the ship and unexploded ordnance on the battlefield.

What it will achieve

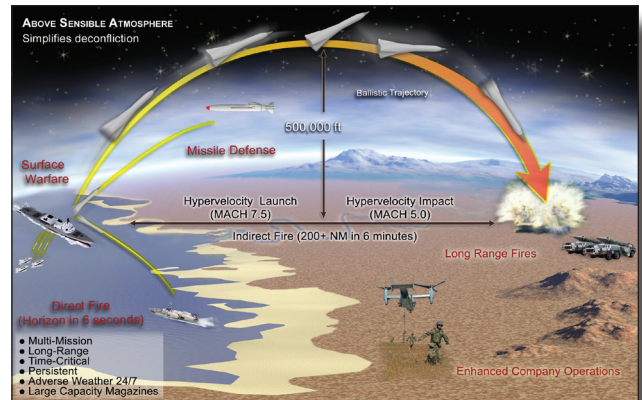
■ The railgun revolutionizes naval surface fire support and time critical strike. The railgun fills a long-standing Marine Corps need for long-range, precision volume fires. It is adverse weather capable, has wide-area coverage, improved ship survivability, simplified logistics and potential multimission applications.

Point of Contact

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The Department of the Navy's science and technology corporate board chartered the innovative naval prototype (INP) construct to foster game-changing and disruptive technologies ahead of the normal requirements process.



The Electromagnetic Railgun INP was initiated in 2005. The goal during phase I is a proof-of-concept demonstration at 32 mega-joule muzzle energy. This is about half the energy required for a fully capable 200-plus nautical mile system and would be capable of launching a 100-nautical mile projectile. This launch energy has the advantage of being able to stress many components to evaluate full-scale mechanical and electromagnetic forces.

Phase I is focused on the development of launcher technology with adequate service life, development of reliable pulsed power technology and component risk reduction for the projectile.

A second phase INP, proposed to start in 2012, will advance the technology for transition to an acquisition program. Phase II technology efforts will increase launcher muzzle energy and concentrate on rep-rate fire capability. Thermal management techniques required for sustained firing rates will be developed for both the launcher system and the pulsed power system.

The railgun is a true warfighter game changer. Wide-area coverage, exceptionally quick response and very deep magazines will extend the reach and lethality of ships armed with this technology.

Research Challenges and Opportunities:

- Extended service life for materials and components in harsh environment
- High-strength, dielectric, structural materials
- High-speed, high-current metal-on-metal sliding electrical contact
- System interfaces between high-power loads and platform power distribution
- Compact pulsed power systems and power electronics
- High-conductivity, high-strength, low-density conductors
- Repetitive rate switches and control technologies
- Aerothermal protection systems for flight vehicles
- High-acceleration tolerant electronic components and structural materials